

	Biomass (g/l)		Glucose (g/l)		Ethanol (g/l)	
	H2193	H2189	H2193	H2189	H2193	H2189
$J_v$ (C-mmol/l h)	1.68	3.01	30.61	36.32	15.27	17.35
$J_s$ (C-mmol/g-cell h)	2.60	3.27	47.37	39.47	23.64	18.85

**IN THE CLAIMS:**

Please add the following new claim.

*02*  
*gyl*  
*g4*  
--39. (New) The microorganism of claim 1, wherein at least one of the recombinant DNA molecules encodes or causes the expression of a gene encoding a pyruvate carboxylase.--

Please amend the claims as follows.

*C3*  
*gyl*  
1. (Amended) A microorganism transformed with at least one recombinant DNA molecule encoding or causing the expression of a gene of at least one enzyme that causes the functional coupling of the oxidation and reduction of substrates by two pyridine nucleotide-linked dehydrogenase reactions that share a common substrate and have different specificities for the NAD/NADH and NADP/NADPH coenzyme couples and so facilitates the transfer of electrons between the two coenzyme couples through the said

03  
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substrates, said transformed microorganism thereby producing an industrial product from carbohydrate more efficiently than does a corresponding non-transformed microorganism, said industrial product being more reduced than pyruvate.

2. (Amended) The microorganism of claim 1, said microorganism producing more product per unit of carbohydrate in a raw material than does a corresponding non-transformed microorganism.

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6. (Amended) The microorganism of claim 1 that under the conditions of a biotechnological process, producing from carbohydrates one or more industrial products more reduced than pyruvate, maintains a higher level of the metabolic capacity required to convert carbohydrate into said products in said process than does a corresponding non-transformed microorganism.

7. (Amended) The microorganism of claim 6, wherein the metabolic capacity required for the said process of a corresponding non-transformed microorganism decreases with time under the conditions of the said biotechnological process.

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17. (Amended) The microorganism of claim 1, wherein at least one of the recombinant DNA molecules encodes or causes the

*Sub E2*  
expression of a gene encoding an enzyme which is a pyridine nucleotide-linked dehydrogenase.

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*Sub E4*  
21. (Amended) A microorganism of claim 9, which is a strain of *Saccharomyces* spp. or *Schizosacharomyces* spp. expressing genes encoding xylose reductase and xylitol dehydrogenase, and which is transformed with at least one recombinant DNA molecule encoding or causing the expression of a gene encoding an enzyme which is a pyridine nucleotide-linked dehydrogenase.

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*Sub E5*  
28. (Amended) A method of producing useful products from carbohydrates, comprising the step of fermenting said materials with a microorganism of claim 1.

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29. (Amended) The method of claim 28, wherein the carbohydrates comprise pentoses, pentose polymers or mixtures thereof.

30. (Amended) The method of claim 28, wherein the carbohydrates comprise hexoses, hexose polymers or mixtures thereof.

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*C8*  
38. (Amended) A method of producing ethanol from carbohydrates comprising pentoses, pentose polymers or mixtures

C8

thereof, comprising the step of fermenting said materials with a microorganism of claim 19.

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